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ABSTRACT

This paper attempts to provide information in response to the needs of educators of adults with learning problems. For the adult education teacher, information is offered on the nature of learning, information processing, problems that can be diagnosed, and strategies suitable for adults with learning problems. For the administrator, focus is directed toward programmatic implications and services for adults with learning problems. The first of four sections examines learning problems and provides observable characteristics of adults with learning problems, insight into how the brain functions, how information is processed, and some reasons learning problems exist. The second section looks at diagnosis of adult learning problems, including the purposes of a diagnosis and seven steps in the diagnostic procedure. Section 3 offers strategies for application of diagnosis to instruction. The discussion includes how learning problems affect teaching, remediation versus compensation, general learning strategies, and specific instructional strategies for specific learning problems. The final section provides recommendations for program planning and design by offering educational alternatives which incorporate the present knowledge of adult learning problems. (CT)

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ADULT LEARNING PROBLEMS: INSIGHTS, INSTRUCTION, AND IMPLICATIONS

by

Laura Peltz Weisel

London City Schools
London, Ohio

The ERIC Clearinghouse on Adult, Career, and Vocational Education
The National Center for Research in Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, Ohio

1980

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FOREWORD

The Educational Resources Information Center on Adult, Career, and Vocational Education (ERIC/ACVE) is one of sixteen clearinghouses in a nationwide information system that is funded by the National Institute of Education. One of the functions of the Clearinghouse is to interpret the literature that is entered in the ERIC data base. This paper should be of particular interest to adult educators in Adult Basic Education, job training, community college developmental, and basic skills programs -- as well as adult education students preparing to work in these areas.

The profession is indebted to Laura P. Weisel for her scholarship in the preparation of this paper. Recognition also is due Dale Jordan, Jordan-Adams Learning Center (Oklahoma); Joan Baker, Quakersville Senior High School (Pennsylvania); and Harold Starr, The National Center for Research in Vocational Education, for their critical review of the manuscript prior to its final revision and publication. Robert D. Bhaerman, Assistant Director for Career Education at the ERIC Clearinghouse on Adult, Career, and Vocational Education, coordinated the publication's development.

Robert E. Taylor
Executive Director
The National Center for Research
in Vocational Education

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This paper attempts to provide information in response to the needs of educators of adults with learning problems. For the adult education teacher, information is offered on the nature of learning, information processing, problems that can be diagnosed, and strategies suitable for adults with learning problems. For the administrator, focus is directed toward programmatic implications and services for adults with learning problems. The first of four sections examines learning problems and provides observable characteristics of adults with learning problems, insight into how the brain functions, how information is processed, and some reasons learning problems exist. The second section looks at diagnosis of adult learning problems, including the purposes of a diagnosis and seven steps in the diagnostic procedure. Section 3 offers strategies for application of diagnosis to instruction. The discussion includes how learning problems affect teaching, remediation versus compensation, general learning strategies, and specific instructional strategies for specific learning problems. The final section provides recommendations for program planning and design by offering educational alternatives which incorporate the present knowledge of adult learning problems. (CT)

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PREFACE

Most adults can successfully apply themselves to new learning experiences. If learning in the past was successful, the return to a learning environment is comfortable. There are, however, many adults for whom learning was always difficult and for whom traditional methods of education only bred failure and frustration. These adults, once termed "lazy" or "dumb" may, in reality, have learning problems, information processing problems that make learning by traditional methods virtually impossible. The adult with learning problems is difficult to retain as a student, either in a traditional classroom or in a learning center. The lifelong learning movement and the back-to-school boom is only doom for these special learners.

Defining the term "adult learning problems" is difficult. Many disciplines contribute to the holistic view of the special learner, but they cannot agree in defining learning problems. Travis' (1979) review of the various terms used in the field illustrate this complexity: perceptually disabled, neurologically handicapped, brain injured, learning disabled, inadequate learning styles, and so on.

The National Association for Public Continuing and Adult Education Committee on Adults with Exceptional Learning Problems developed the following definition:

> Adults with exceptional learning problems have a disorder, or disorders, in one or more of the basic processes involved in learning. These include difficulties in selective attention, information processing, memory retention and retrieval, utilization of feedback and carrying out intentions. Learning problems may be manifested

> in difficulties with listening, talking, reading, writing, arithmetic and interpersonal communication. They may include such conditions referred to as learning disabilities, perceptual or neurological handicaps, minimal brain dysfunction, dyslexia, organizational problems and developmental delay. Included also are the minimal visual and auditory dysfunctions that occur due to aging, unusual occupational conditions or physiological problems. (Position Paper, 1980)

Definitions are not ultimate truth. They merely provide some ground rules and name the game. NAPCAE's definition of adult learning problems offers grounds for common understanding. All adults may at one time or another experience difficulties in learning, but it is the consistent interference in the learning process which distinguishes adults with exceptional learning problems from the remainder of the adult population.

Educators have long been puzzled and frustrated by adults with learning problems. This paper attemps to provide information in response to their need for further information. For the adult education teacher, information will be offered in regard to the nature of learning, the processing of information, problems that can be diagnosed, and strategies designed for learning which are suitable for adults with learning problems. For the administrator, focus will be directed toward programmatic implications and services for adults with learning problems.

The paper is organized in four parts. The first section examines learning problems and provides observable characteristics of adults with learning problems, insight into how the brain functions, how information is processed, and some reasons why learning problems exist. The second section looks at diagnosis of adult learning problems, including the purposes of a diagnosis, and seven steps in the diagnostic procedure. Section three offers strategies for application of diagnosis to instruction. The discussion includes how learning problems affect teaching, remediation vs. compensation, general learning strategies, and specific strategies of instruction for specific learning problems. The final section provides recommendations for program planning and design by offering educational alternatives which incorporate the present knowledge of adult learning problems.

My thanks go to the many adult educators throughout the country who have supported efforts in furthering a new and valuable field in adult learning. Their constant feedback, collecting of data, sharing of case studies, and trying out of new ideas has brought a national spirit and applicability to this manuscript. A note of gratitude is expressed to a number of

people for helpful criticism and discussion of the manuscript during its development. For components on learning problems, identification, and instruction: Dale Jordan, Oklahoma City; for suggestions regarding brain functioning, learning theory, and human development: Marlin Languis, The Ohio State University; for continuous encouragement, support, and editorial comments: George Travis, The Ohio State University, Nevin Robbins, University of Southern Mississippi, and Phil Prey, Marshall University. A special note of appreciation goes to Bernita Oberholtzer, Frank Bongen, and the many adults with learning problems who have shared their lives for the purpose of helping others.

LEARNING: THE NEED FOR UNDERSTANDING

To begin a discussion on learning problems, it is important to review the learning process and to identify some problem areas.

THE LEARNING PROCESS

Learning is a fascinating process. Recent brain research has focused on how an individual learns from the environment. Results of this research have shed a ray of light upon a rather dim arena. The process of learning can simply be viewed as making meaning out of confusion. White and Seigel (1976) note that "meaning" includes:

> . . . organizing . . . locating information in a 'noisy field', finding distinctive features and reducing uncertainty (p. 429).

In the learning process, individuals interact with their environment in trying to understand what is going on around them. Different individual interpretations, which are often generated from the same experience, seem to parallel the different types of strategies for learning available to the human brain. The ways in which each individual learns can be called a learning style. A learning style is an integration of features which distinguish one person's approach to learning from another's. These features appear to be deeply embedded in personality and development. They give style, consistent direction, and depth to an individual's learning behavior (Languis, Sanders, and Tipps, 1980).

Young (1978) explains that the act of learning results in the formation of "programs" within the brain. Much like high speed computers, programs of the brain have a great influence over

how humans think, communicate, feel, play, value, help, and love. An individual's learning style is composed of a vast number of complex programs.

Individual styles vary because no two individuals have the same set of programs. These differences influence both how one goes about understanding and how one expresses information. In a lecture situation, one person might find that note taking is the preferred style of learning, while another finds listening, followed by a discussion with peers to be most advantageous. Both are different approaches to learning the same information. The measure of outcome also may vary. Individuals have their best way of demonstrating the mastery of information. One person might excel on essay tests while another performs best in a discussion with the teacher. In each situation, it is taken for granted that the information presented has been made meaningful.

According to Piaget, a learning style is developed by behaviors and experiences which help the individual to make their environment less confusing (Philips, 1975). Those behaviors (or thought processes) that enrich understanding are internally rewarding because they appear to work, and hence become the basis for future systems. External rewards (such as a smile or a "that's right"), are useful in motivating the continuation of successful behaviors. External rewards may be used as strategies for enhancing an individual's learning (Buck, 1976). Behaviors and experiences that do not enrich the individual's learning style are less likely to be tried again (Meyer and Meyer, in press).

Consequently, adults learn through the development of a set of strategies that help them comprehend the world in which they live. There are times when established strategies prove unsuccessful and new alternative strategies must be tried. The new or alternative strategies may or may not work. Some individuals become totally disoriented and frustrated when primary and/or alternative strategies are not successful. If these periods of confusion are infrequent, they often can be forgotten. For most adults, their stability and confidence remain intact because success is readily available in other life situations. However, when alternative strategies provide only inconsistent success and other successes are rare, the adult begins to react to life through a regular state of confusion and instability.

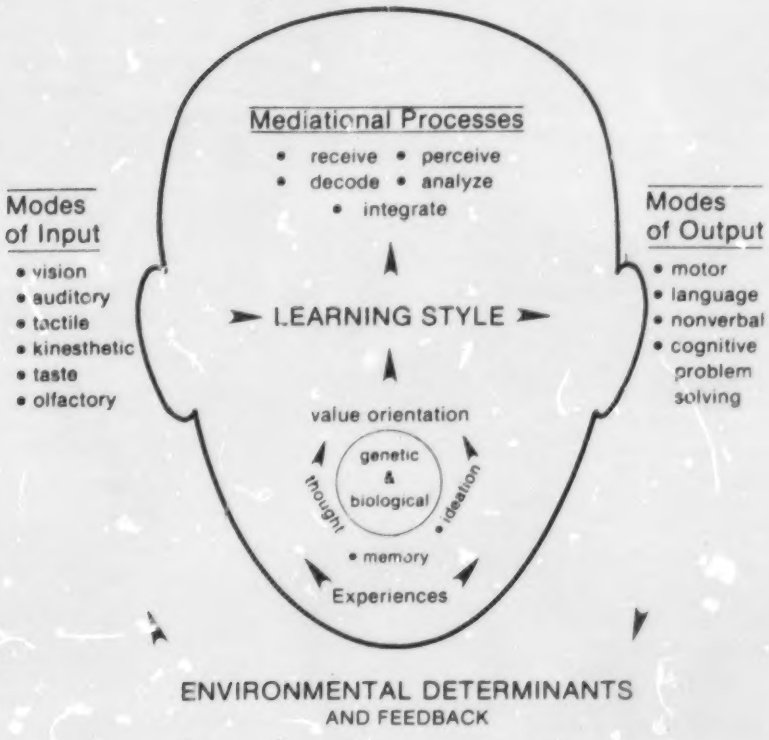
A MODEL OF LEARNING: INFORMATION PROCESSING

In recent years, research in the learning process and individual differences has led to a model of information processing. This model provides for the individual as an active processor of information rather than a passive participant. The information processing approach to psychological events formulate a flow chart, or sequence of events, similar to the format of a complex, multi-dimensional computer program. In a computer program, a series of steps or rules tells the computer what to do. The basic idea of information processing is to identify similar steps involved in psychological activity and some of the factors that individualize learning. Of course, humans are much more complex and active than a computer.

The information processing model implies that learning is based upon a vast number of highly organized and sequential programs. Thus, the theory of information processing is essentially a statement of the programs with rules for operation, restrictions placed upon the rules, how the rules combine, and how much information the program must first contain (Ellis, 1978).

Information Processing

FIGURE 1



The above model (Figure 1) illustrates how the environment is received through one or more modalities: vision, hearing, kinesthetic (movement), tactile (touch), olfactory (smell), and taste. The way in which individuals receive, analyze, and integrate the inputs from the environment will be determined by their learning style. For example, a person may see a familiar figure walking toward them. First, visual information is received through the eyes and sent to the occipital lobes where the image is analyzed by a complex set of features such as height, shape, location of meeting, and so on. The brain searches for a match within its previously stored information. If a greeting is received in the form of an auditory input through the ears, the voice is analyzed and then integrated with the visual analysis which may finally help in sorting out a match to identify the approaching figure. The next step in the process is the formulation of a response or

output of acknowledgement. This also is very individual in that a nod, a smile, a verbal greeting, or a totally ignored response may suit the situation. Once the output in the form of a response has been given, there may be a reply (feedback) that is received, analyzed, and integrated again. The information processing model provides that feedback is necessary to confirm or deny realistic interpretation of the world. The learning must utilize the original input, its analysis, and selected response in conjunction with the feedback provided through the environment in order to achieve efficient information processing. The feedback is useless if it is not paid attention to, accurately analyzed, and/or integrated with the response that had prompted the feedback.

Learning Styles into Learning Problems

Every human processes information differently. These differences exist due to the contributing factors of a learning style: genetic and biological features, brain structure, experiences, and the culture to which the person has been exposed (Young, 1978). Individuals interact with their environment in a different way because of these differences.

Individual learning styles are the results of these differences. Because each individual perceives their environment differently, there may be different interpretations of the same situation. A continuum of learning styles (from structured to unstructured or more accurate to less accurate, and so on) in daily living allows for interpretations that are different but still acceptable, and some that are considered inappropriate. Unlike daily living, academic situations reduce learning and how well one has learned, to be categorized as either accurate or inaccurate, right or wrong.

Most adults adequately process information, integrate feedback, and accurately interpret their environment. Yet, there remains a portion of the adult population who have learning styles that do not accurately process information or integrate feedback. From an outsider's point of view, these adults appear to be functioning normally. However, in reality, they misperceive environmental cues and may not attend to feedback or be capable of integrating an accurate response. For this reason, these individuals often are referred to as having an "invisible handicap". When placed in an environment that demands either right or wrong responses, the individual with an invisible handicap has difficulty with problem solving, building upon previous learning, transferring information, comprehension, and retention of new learning.

Adults who have difficulties with information processing often are unable to change their learning styles. For them, learning may not be just a matter of using previously tried and true strategies. An individual's learning style could have built-in inconsistencies or incomplete or incompatible programs leading to major roadblocks and dead ends. Learning styles for these adults often become the basis for their learning problems.

Moss (1980) notes that there are between thirteen and sixteen million adults with learning problems in the United States. In Adult Basic Education programs, learning problems have been diagnosed in 50 percent of those students functioning at the eighth grade level and below, and in 85 percent of those functioning at or below the fourth grade level (Weisel, 1979). For those adults experiencing problems in learning, employment is limited to a narrow range of occupations. Adults with learning problems often have found coping mechanisms on which they heavily rely. One student told everyone that he was hard of hearing so that they would speak more slowly and louder than usual. Social interactions, work situations, and academic requirements are difficult for these adults. Lacking compensations, adults with learning problems often avoid situations in which they are uncomfortable. Avoidance leads to isolation and withdrawal, compounding emotional problems with the already existing difficulties in coping with the world.

There are, of course, degrees to the amount of difficulty an adult may be having with processing of information and problems in learning. A mild extent of learning problems might be indicated when limitations do not greatly interfere with normal activity. Adults with mild learning problems can maintain themselves in low stress jobs with some assistance and are in need of only minor daily living modifications. They may have an educational history inconsistent with their potential and appear to have marked differences in strengths and weaknesses (CANHC, 1976).

Adults with moderate learning problems require modifications in daily living patterns in only specific areas such as counseling in social skills, organizing the home, and budgets. There is a great need for consistent external structure in order to maintain low stress employment and appropriate social skills. These adults will tend to have a narrow range between strengths and weaknesses, with a resulting lower potential for performance.

Severe cases of learning problems have limitations that seriously interfere with their functional capacity. These

adults cannot maintain employment without extensive therapy and require major assistance in most daily living activities. Adults with severe learning problems usually have previous school failures. Their diagnostic profiles demonstrate major weaknesses and a very low degree of academic ability without the characteristics of retardation. These adults may have difficulty orienting themselves to the use of transportation and consistently lack social skills.

INSIGHT INTO ADULT LEARNING PROBLEMS

The study of adults with learning problems appears to be intricate and mysterious. It must be accepted by educators that the field has not been reliably nor fully charted (Farnham-Diggory, 1978). We have come a long way from the seventeenth century ideas of Descartes, who believed that intelligent little creatures lived inside the head and pulled strings when certain behaviors were needed. In the last fifty years, researches from many disciplines have studied the brain, its functioning, and information processing. Just as the blind men each described the elephant differently, each discipline has contributed to a multi-dimensional perspective of learning problems.

Adults with learning problems have begun to speak of themselves. Park (1979) wrote:

> Imagine living in a world where nothing is stable, where the space between your body and other objects is not clearly perceived, and the message your brain sends your limbs never quite manifests itself in the proper action. A world where even the act of walking requires immense concentration because the floor seems to shift under your feet.
>
> The simplest acts, holding a pencil, exerting the proper pressure to produce a legible impression without breaking the point, reading a sign, finding your way back to a previous location are incredibly difficult. (p. 10)

Oberholtzer (Parer, 1977) described feeling lost in space and was sure that no one else was aware when this was happening. She stated that she could remember lots of things but was unable to recall them on demand. Bongen was diagnosed as having

learning disabilities and was told that he was very bright. He knew that school was going to be difficult, but his counselor implied that if he tried hard that he could master it. On film, Bongen states, "I try hard, but I just don't think I can do it."

For educators, these statements are distressing. Many professionals through years of teaching have recognized differences in learning ability and in learning styles. These concerned professionals remain unable to identify what they are observing or why these differences exist.

Nine Major Observable Characteristics

Jordan (1977) and Weisel (1979) both provide adult education teachers with nine major observable characteristics for the identification of adults with learning problems. These observable characteristics may be used to exemplify the learning problems as described in the National Association for Public Continuing and Adult Education (NAPCAE) position paper. Not all of these need to be present to confim diagnosis; however, observation of only one characteristic should not lead to the unwarranted conclusion that learning problems exist. The nine major characteristics are surface symptoms, not a diagnostic measure in themselves.

1. Vision Difficulties

   Vision difficulties are often present in adults with learning problems. Many vision problems occur with binocularity, or using the two eyes to work together. The two eyes must align, focus, and move together for the sustained visual tasks necessary for reading, writing, and mathematics. When the two eyes do not work together, the images sent from the eyes to the occipital lobes are confused in reception and image analysis. One image is often suppressed. The following characteristics may be caused by factors other than difficulty with binocularity, but if any of these occur, vision related learning problems might be present:

   - Loss of place while reading
   - Patterns of errors related to the misreading of beginnings, endings, or middle of words
   - Reddened, watery, or crusted eyes
   - Complaints of frequent headaches

- o Loss of comprehension with increased reading/study time.

2. Subvocalization

Subvocalization (making vocal sounds during reading, writing, or listening) is often a key observation to identifying a student experiencing problems in learning. Because of the underlying difficulties in associating sounds to written symbols, the adult with learning problems must use a variey of stimulus channels to verify their decoding impressions. In subvocalization, the adult is adding supplemental modalities (hearing, moving lips, speech, etc.) as part of their learning style. This need for more than one input of information may be an appropriate compensation and not a learning problem in itself. It is only when these same adults are placed in an environment with restrictions and limits that confine these natural compensations that the problems in learning will exist.

3. Letter/Sound Confusions

Letter/sound confusions include difficulties in differentiating between similar sounds such as t/d, f/th and the matching of sounds to symbols correctly. Faulty reception, lack of conceptual understanding of graphic to phoneme representation, and perception or attention can lead to confusion in beginning sounds (mill/nill), medial sounds (cottage/college), and endings (pat/pad). Often, the overemphasis of phonics as a prereading skill has led adults to assume that sound/symbol matching is the only approach to attacking words rather than utilizing approaches that are more consistant with their learning style. Characteristics that can be observed are:

- o Omission of letters (Satday)
- o Substitutions of letters (Septambar)
- o Additions of letters (Thuesday)
- o Obvious sound/symbol confusions (neilboor)
- o Excessive crossing out, rewriting, and erasing.

4. Confusions in Sequential Order

Confusions in sequential order can be noted in such tasks as placing the alphabet, days of the week, or months of the year in proper order. These same types of confusions can be seen in sequencing errors in spelling and reading. Sequencing problems indicate a lack of visual memory or a structural order in which processing information is organized and stored. Typical spelling errors include: Apirl, gril, Juen, Ferburay, and Firday. Examples can range from blay/play to lbend/blend to bilobigraphy/bibliography. Sequencing confusions can also be confusions in directionality of up/down (b/p) or right/left (b/d) and inconsistent orientation in reading left to right.

5. Poor Sensory Integration

Poor sensory integration occurs when many modes of informaion need to be received, analyzed, and integrated at the same time. The basic sensory channels for learning (visual, auditory, kinesthetic, tactile, and speech) are not simultaneously integrated. For an adult with learning problems, the visual image, auditory reception, and thought process may all be on different wave lengths or time orientations. It often appears that the adult cannot "get it together". Adults with learning problems often compare this to a film where the voice is seconds behind the visual image. As with other processing problems, sensory integration may be inconsistent.

Integrating sensory inputs can be a deeply frustrating experience. Clues to these difficulties can occur when the adult needs to do two tasks at once (e.g., turn to a specific page in a book while listening to further directions). The result may be confusion in finding the page or in the listening for further directions. Classic difficulties exist with the standard spelling test when a word is said and then used in a sentence. The student must simultaneously mediate the visual image of the word, match sounds to symbols, and coordinate a motor response of moving the pencil on the paper to correspond with a written communication of a thought process. The teacher is in the meantime continuing with a sentence that also must be processed.

6. Low Frustration Threshold

Low frustration threshold increases under the stresses, strains, and frustrations of sensory

integration. This low boiling point contributes to a negative self-image. Inconsistent success with various learning styles places the adults with learning problems in a situation in which they cannot trust themselves. What worked yesterday may not work today. Cues to low frustration threshold include anger, acting out behaviors, excessive absences, varbalization of failure, confusion, and short attention span.

7. Low Self-Image

A low self-image is an underlying characteristic of adults who have experienced continued difficulties with learning. Very little self-confidence results from living in a world of confusion and disorder when the unexpected will usually happen. Low self-image can be noted in personal care, posture, extreme social behaviors, and the adult's self-description. A good feedback technique is to praise these adults when they respond correctly. Unfortunately, this praise is usually directed toward how the adult is doing. Adults with learning problems react negatively to how ("That's really great!") praise because it is in such conflict with their own self-image; hence, this type of feedback confuses the student to an even greater level. Praise that emphasizes what they are doing ("You've completed the whole page.") stresses what is important without causing an internal conflict.

8. Unrealistic Expectations

Unrealistic expectations are closely related to a low frustration threshold and low self-image. Ineffective learning styles and poor transference of learning lead to a misconception of the length of time it takes for a task to be completed. A comment like, "I'd like to get my GED by Christmas" from a nonreader beginning school in September indicates that the adult's desires do not match reality. These adults often set up an unrealistic time frame for themselves. When they do not reach their goal, they become frustrated and their negative self-image is reinforced.

9. Faulty Metabolism

Faulty metabolism often interferes with the learning process. Allergies, poor nutrition, borderline hypoglycemia, and medication place the nervous system in a state of disarray. Clues that may indicate metabolism problems are inconsistent behavior

and work patterns, condition of complexion and hair, extreme nervous or lethargic behaviors, and distractibility. Recent research (Restak, 1979) in neurotransmitters suggests that limits may exist between information processing and neurochemical imbalances.

PIECES OF THE PUZZLE

It is certain that our behavior is a product of our nervous system (Hilgard and Bower, 1975). This system is influenced by internal factors (brain functioning), external factors (environment and experience), and developmental factors. Any of these factors may be sources of learning problems. In reality, each of these overlap and unite to contribute pieces to the puzzle of learning problems. To fully grasp the complexity of the puzzle, each factor will be dealt with independently and then integrated into the world of the adult with learning problems.

Internal: The Working Brain

Basic knowledge of the brain and how it works is most helpful in comprehending internal roadblocks to the learning process that are experienced by an adult with learning problems.

The brain weights about three pounds and is about the size of two fists held together. Within its grayish-pink mass are a series of bilateral structures with the left and right brain hemispheres comprising the uppermost portion of the brain, the cerebral cortex. This bilateral organization also extends downward to the middle region of the brain or midbrain which houses the limbic system. Both sensory and motor pathways are crossed in the brain. This means that the right side of the brain feeds information to the left side of the body while the left side of the brain directs its information to the right side of the body. This is known as contralateral or crossed organization. Brain/body pathways are not always contralateral; however, those that are tend to be significantly stronger than ipsilateral or uncrossed paths (Languis, Sanders, and Tipps, 1980).

There are four major portions of the brain: the cerebral cortex, the midbrain, the brain stem, and the cerebellum. Each has its own separate functions and structures (figure 2). Teyler (1975, 1977, 1978) likens the brain to a walnut, with the meat of the walnut being protected by a tough shell in much the same way that delicate brain tissues are surrounded by a bony and protective skull. The membrane surrounding the brain tissue and located below the skull which acts as a shock absorber is called the meninges.

Specific Brain Functions

FIGURE 2

Just as the meat of the walnut is wrinkled, so the surface of the two halves of the cerebral cortex are wrinkled. The two halves are connected by a band of over 200 million nerve fibers called the corpus collosum. Between the spinal cord and the cerebral cortex is a stalk of neural tissue called the brain stem. Over a million whitish nerve cells within the cortex connect different regions of the brain. Other nerve cells (axons) connect the brain with the rest of the body through cranial nerves and the spinal cord. Special nerves that bring information from the environment, through the senses into the brain, are called afferent nerves. Information travels from the brain to the body and extremities by way of efferent nerves. All along the

neural pathways are synapses. Synapses are small gaps where messages can be carried right through, changed, or entirely stopped. Neurotransmitting chemicals carry information across the synapse gap while electrical impulses stimulate the continuation of the message through the nerve. The brain contains over fifteen billion neurons.

The cerebral cortex is often considered the most highly organized portion of the central nervous system. This part of the brain is involved in all kinds of conscious effort (Tarnapol and Tarnapol, 1977). Both internal and external stimuli are received and analyzed in the four lobes of the cerebral cortex. Information, in the form of a feedback loop, is transferred between the cerebral cortex and the other portions of the brain (Furst, 1979).

The cerebral cortex is comprised of sensory reception, association, and motor areas. The cerebral cortex houses four lobes: the occipital, perietal, temporal, and frontal. The lobes work together to receive, analyze, and integrate information. The occipital lobe, in the rear of the brain, receives visual information directly from the eyes. The parietal lobe is an area of visual association, analysis, and perception. Auditory information is received in the temporal lobe. Portions of the temporal lobe are specific for analyzing and integrating language information. One particular portion of the left temporal lobe, Wernicke's Area, is concerned with the perception and comprehension of speech.

The frontal lobe is primarily concerned with goal-oriented and purposeful behavior (Luria, 1977). Often referred to as the executive branch of the brain, the frontal lobes participate in decision making for the majority of brain activity. One specific region of the left frontal lobe, known as Broca's Area, is concerned with expressive speech. Separating the frontal and parietal lobes is the motor cortex. This portion of the brain is involved in movement and sensory stimulations. Organization of the motor cortex is inversed, with the features of the head (that is, eyes, lips, facial muscles) being controlled at the bottom-most region of the motor cortex, thus leading upward to the shoulders, hands, chest, stomach, pelvis, legs, and - finally - at the top, to the toes.

The cerebral cortex is divided into two hemispheres. Sperry's (Gazzaniga, 1977) research in the 1960s provided evidence that each hemisphere of the brain has a separate function. In the nineteenth century research, autopsies of stroke victims showed specific symptomatic disorders in separate lesions. Symptomatic disabilities were traced to specific points of damage. Wernicke's left temporal region, when damaged, resulted in

specific disabilities of language comprehension. Damage to the frontal lobe, in the area known as Broca's Area, led to specific speech disorders.

Sperry conducted research with severe epileptic patients who had their corpus collusum severed resulting in a split between the two hemispheres, that is, there was no interaction between the two halves of the brain. Through patient follow-up, it was reconfirmed that brain functions were not only contralateral but that each hemisphere also had its own way of thinking.

In 95 percent of human beings, the left hemisphere is superior in serial ordered logical tasks and explicit procedures such as language. The right is better at simulations, spatial orientation, nonverbal, and implicit procedures such as visualizations and imagery. Normally, we utilize both halves to integrate information. There appears to be some redundancy of functions between both the right and left hemispheres in that the right hemisphere does handle language, while the left hemisphere also can be somewhat involved in implicit procedures. Albert (1978) noted that differences occur in hemispheric functioning when different demands are placed upon an individual. For example, in the bilingual individual, the right hemisphere appears to be utilized in language perception and expression.

The cerebral cortex surrounds a portion of the brain referred to as the midbrain. Herein lies the limbic system which includes a series of tiny structures (for example, the pituitary gland, hippocanpus, hypothalamus, and so on). These structures regulate interral body states and functions through the analysis of hormones in the blood stream. As one of the monitors of internal equilibrium, the midbrain monitors blood-borne hormones and also controls their release.

The brain stem contains groups of cell clusters that form the Reticular Activating System, called the RAS. The RAS regulates environmental stimuli coming into the brain and controls attending behaviors. Incoming messages can be stopped or allowed to continue onward to the higher regions of the brain for processing. An example of this would be the baby's cough that awakens the soundest sleeping parent while the ringing alarm clock is never heard. This "gating" mechanism keeps us from drowning in an ocean of stimuli and allows for selective attention through a feedback loop.

The cerebellum functions as a neurological computer (Furst, 1979) that regulates higher order reflexes and coordinates the movements of muscles in activities such as walking, standing upright, and general movement. Luria (1973) notes that harmonious interaction of all portions of the brain are necessary

for normal brain functioning.

Models of the Working Brain

Understanding the adult with learning problems can be further increased through an understanding of how some of the brain functioning may occur. Languis (et al., 1980) notes that brain models provide both an integrated and systematic approach to understanding the whole of brain functioning through emphasis of the salient features in overall functioning. Although much of how the brain operates is still in the hypothesis testing phase, the three models to be presented below each add to the understanding of the complexity of brain functioning and areas for problems in learning:

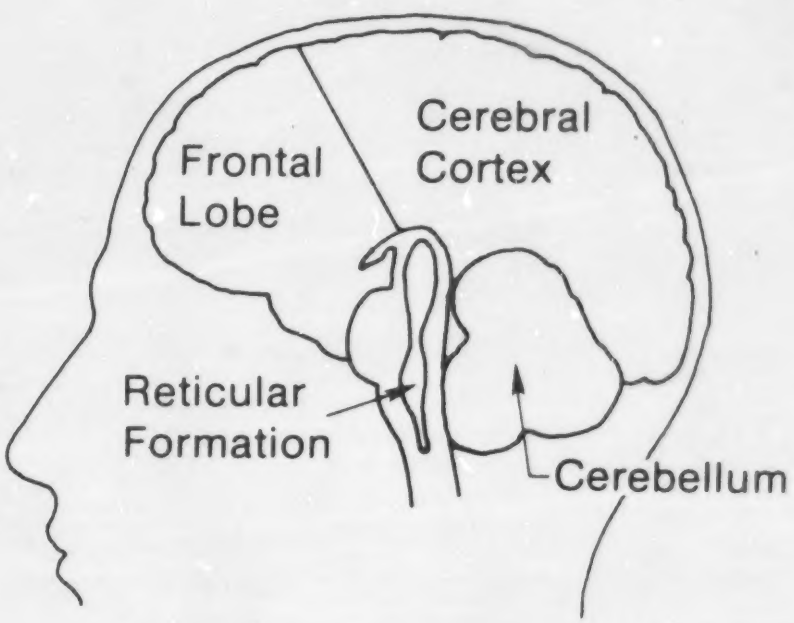
- Reticular Activating System model (RAS)
- Triune brain model
- Computer model

The Reticular Activating System (RAS)

In the past twenty years, extensive investigation of the RAS has taken place in studies of sensory deprivation (Thompson, 1975; Buck, 1976; Boddy, 1978). The RAS begins in the brain stem with the reticular formation.

The Working Brain

FIGURE 3

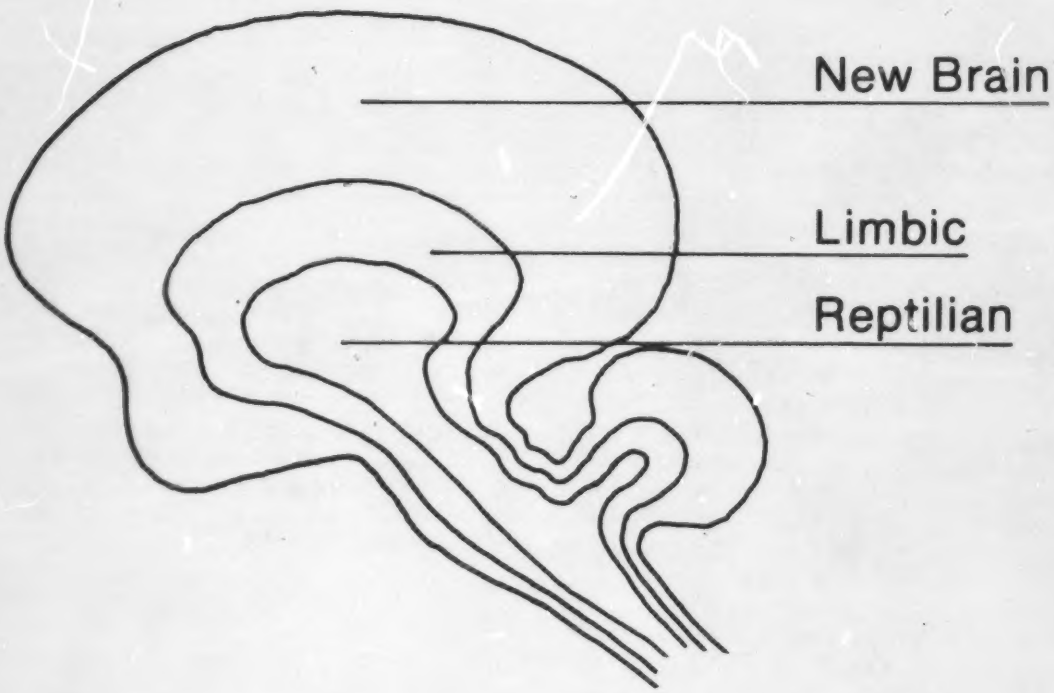


All sensory information enters the reticular formation that activates the entire central nervous system (brain and spinal cord) through a network which sends information to the brain from the body and to the body from the brain. This is actually similar to a "wake-up call" telling the brain to be on alert for further information. The need for being aroused underlies virtually all brain structures for reception, analysis, and integration of sensory information. The sensory inputs are then allowed to enter the higher regions of the brain for reception, analysis, perception, and integration. If the RAS is destroyed, profound and enduring coma results. Through sensory gating (that is, the stopping of information from arousing the brain for comprehension and action purposes), the working brain exerts considerable control over its sensory input channels. The frontal lobe feeds back decisions to the reticular formation as to what will or will not be allowed to induce the attention of the brain. Hence, not all sensory information is responded to equally because of the highly selective gating mechanism (Young, 1978). Learning problems can result when adults cannot attend to one stimulus while ignoring others that are concurrently present. This might occur when a student attempts to listen to an instructor's oral directions but is continually distracted by other students speaking in the room or when a student is trying to concentrate on reading but cannot ignore all of the other thoughts going through his head.

The Triune Brain. The model of the triune brain, or the three brains, is the work of McLean (1978). In this model, the brain has developed along three hierarchial patterns which are distinctly different in chemistry and structure (figure 4). In terms of evolution, they are eons apart. The newest brain, the neocortex, in the uppermost region of the cerebral cortex, is associated with higher cognitive processes such as thinking, planning, organization, and creative ideation in addition to reception, analysis, perception, and integration of incoming information. It is this part of the brain, characterized by large associative areas and frontal lobes, that has evolved to distinguish man from animal.

Evolution of the Brain

FIGURE 4



The limbic system, or cap to the brain stem, is a much older structure lying beneath the neocortex. Restak (1979) points out that herein lies the controls for feeding, feeling, fighting, and sexual behavior.

The oldest of the three brains is the repitian brain, or R-complex. Lower order behaviors of survival, territorial assertion, pecking order, and ritualism are controlled in this region. The R-complex controls many of the behaviors that appear to be instinctual. An example might be seen when a group of students return weekly to the same classroom. In

most cases, a student with learning problems will have staked out his own seat and may become disoriented if it is occupied by another student or if the room is rearranged. Jerison (1977) notes that each of the triune brains has its own intelligence, subjectivity, and sense of time and space.

Although each part of the brain plays a part in human behavior, higher level thinking of the neocortex has the major role in survival. In times of stress, the brain downshifts (Hart, 1975) and the lower order behaviors of emotions and instinct often take priority over higher cognitive functions. Adults with learning problems, often in a state of stress when presented with academic material, interpret the learning situation emotionally and may feel threatened. Previous failures with learning may produce such emotional turmoil that the adult may be unable to concentrate, or may become instantly frustrated at the smallest hint of confusion.

The Computer Model. Computer-like programs within the brain are behaviors or patterns of thinking that develop from one experience, or sets of experiences, into set patterns. Hebb (1949) suggests that pathways connecting certain cells are strengthened by experience and result in "cell assemblies". Many cell assemblies (experiences or thoughts) form together into concepts or phase sequences. The number of possible cell connections in the brain alone are larger than the number of atomic particles in the universe (Thompson, 1975). The immense possibilities of cell interactions illustrate this intricate complexity of the brain.

Young (1978) proposes that "programs" control our thoughts and actions. A program is a plan of action selected from a set of possibilities to meet particular types of situations. Programs are determined by genetics along with brain structure and learning gained from previous experiences. Young states that the brain programs range from DNA programs for body shape, hair color, and sex to species programs for brain structure and programs learned from the individuals' interactions with their environment. The essence of living, according to Young, is to develop certain ways in which to attempt to make life meaningful and to successfully interact with the surrounding environment. Through the development of programs, life is made meaningful and sustained.

Higher level programs can be seen as learning styles formed from previous experiences. If thinking through a difficult situation has proven successful in the past, then a program has been established for future difficult situations. If smiling worked as a technique for getting a desired object, then a program has been established for obtaining objects of desire. Learning experiences may result in changes in brain

organization, learning styles, and expectations through brain programs (Lanquis, Sanders, and Tipps, 1980). Adults with learning problems have difficulties in interconnecting ideas and thoughts in addition to incomplete, unstable, or unsuitable programs.

IMPAIRMENTS IN INFORMATION PROCESSING

There appear to be four major areas in information processing where breakdowns may occur. Each may result in learning problems. These include impairment in feature detection (reception and analysis), perceptual masking (attention and gating), the memory process (organizational input and retrieval), and coordination information (program development).

Impairment in feature detection. Information from the environment is presented to an individual through many modalities. Problems occur in the speed (within fractions of a second) with which the specific features (such as which side is the line attached to the circle for a, b, d, p, or g, or the difference between horse and house, and the like) of the information are received, analyzed, perceived, and integrated with previously stored learning. All features of an input are not analyzed instantly. Some of the unused information needs to be stored in the brain for a short time while the first features are being analyzed. This is the process of short-term memory (Farnham-Diggory, 1978). In this stage, information cannot be held for very long periods of time. It must be integrated in the mediational process relatively quickly before it fades away.

Adults with learning problems are slow processors of information (Joran, 1977). Studies by Stanley and Hall (1973) found that the short-term memory for feature detection varied as much as 30 to 50 percent between normally functioning individuals and those with learning problems. Difficulty arises both in the length of time that it takes to have the features of an input noted and the length of time that features can be held in storage before being analyzed. An example of this difficulty is the length of time that an adult with learning problems may take to process a complex sentence (decoding words, and reading for meaning while holding all the parts in short term memory for analysis and integration with previous knowledge). Further examples are confusions in directionality, auditory and visual comprehension, and sequential memory of vision or auditory inputs.

Impairment due to perceptual masking. Perceptual masking refers to the superimposing of one input upon another. If the second input interrupts the ongoing perception, the first input will be lost in the accumulation of more information.

Similarly, the second input may also be lost if it is interrupted during its perceptual time. Perceptual masking has a great deal to do with short-term memory and impairment in feature detection.

Imagine a busy airport terminal. Many planes are landing, many are in holding patterns, several are taking off, and a few are taxiing the runway for take off. The weather must be constantly monitored and future incoming flights anticipated. This busy airport terminal is very similar to the brain and how it must process so many various pieces of information at any one time. If too much attention is paid to any one task without storage and continuation of ongoing analysis, the individual will lose control of many of the pieces of information. If one item is not picked up for interpretation at its time in sequential analysis, a collision of information will occur with some fragments lost forever, while others remain fairly intact.

Attention can either be selective in determining which inputs will be processed or just the reverse when all inputs are given attention for further processing. Hyperactivity (habitual nervous and jittery behavior)is a state of overarousal in which all inputs are allowed equal access but none get properly analyzed due to the masking effect (Wittrock, 1980). An example of an impairment in perceptual masking is the student who is distracted by voices in the classroom and cannot concentrate (not enough selectivity of attention on what will or will not be analyzed). Difficulty in using pictures for context cues (that is, cannot isolate that which is important) and complications in looking back over text to locate specific details are further illustrations.

Impairments in memory processes. Even though there may be ample time for feature detection and control of inputs to avoid masking, troubles may still exist in particular tasks. These troubles may be centered around memory storage. Problems may occur in the short-term holding pattern for feature detection, simultaneous retention of separate units without superimposing, or in the input and output of long-term memory.

Once information is put into short-term memory, it must be acted upon within a certain time duration (often less than one-half of a second) in order to preserve the integration of the input into meaning. The act of remembering is not a passive operation (Farnham-Diggory, 1978). Strategies can be developed for memory programs that involve information management. Adults with learning problems have inaccurate or ineffective programs for information organization and have great difficulties and inconsistencies in memory input and retrieval.

Impairment in the ability to coordinate information. Successful comprehension, that is, learning, depends greatly upon the ability to integrate new inputs of information with previous knowledge. Generative learning theory (Wittrock, 1977, 1978, and 1980) suggests that learning takes place only through combining existing knowledge with new information. It is often the integration that is more important than its parts, with the end product being the formation of a new concept.

Adults with learning problems have difficulty in coordinating information on three different levels. Trouble may exist when the adult attempts to coordinate information from different inputs at the same time. Matching what is being seen with what is being heard and with what is being thought tends to be a major effort for any adults with learning problems. Sensory integration can initially stump students before they are given a chance to interact with the information that is being presented.

The second type of difficulty in coordination of information lies in assimilating the newly received, analyzed, and perceived information with previously stored knowledge. If the new information is not integrated with that which is already known, the generation of new learning will not occur. Memory scanning and location of related ideas is an essential process for learning. Holding the new concept in isolation will not result in long-term memory.

Thirdly, integration of information may be sidetracked in the coordination of an input with an output. Adults with learning problems have multiple inconsistencies in their functioning abilities. One adult may be highly verbal but have difficulty organizing thoughts. Another may be very organized in thoughts but have difficulty locating the right words to express them. Coordination of thoughts with speech or a motor response may be precisely the area of difficulty with an adult problem learner. A student may be able to read a short paragraph, but the completion of a written summary of the reading would present great difficulty. Conversely, written evaluation might be adequate but a verbal discussion could lead to greater confusion.

External: Learning from Experience

Experiences are crucial in an individual's development. Learning is dependent upon the integration of new experiences with previously acquired information. Restak (1979) points out that humans are shaped by their environment in a manner similar to the transformation of a block of stone through the skill of a sculptor. If the sculptor's skill is deficient, the

end product may be distorted rather than a work of art. Environmental variables may lead to disturbed brain organization and function. In most cases, the infant's brain, as it develops, responds to massive environmental variables. External factors that can lead to learning problems include poor nutrition, poor home experiences, and unsuccessful experiences in formal learning.

Undernourishment adversely affects some of the most important aspects of brain development. Severely malnourished children show a 50 percent decrease in behavioral performance that affects memory, abstract reasoning, thinking, and verbal ability. Malnutrition can isolate an individual from its environment in terms of learning and memory, resulting in a lack of interest, apathy, a preference for sameness over novelty, and a reduction in exploratory behavior (Restak, 1979). Behaviors such as irritability, fearfulness, and a heightened startle response also may result.

A lack of external stimulation during decisive developmental periods is also crucial. Most cases of malnutrition are compounded by reduced environmental stimulations. In both cases, lack of proper nutrition and poor environment occur during the first two years of life which are critical periods for development of the brain. Rarely can early deprivation be remediated to full potential. An even more startling problem may exist in behavioral abnormalities from malnutrition in one generation being carried over to another generation despite the eventual introduction of an adequate diet and environment (Restak, 1979).

Mother-child interactions are of great importance. Bernstein (1961, 1975) found that language growth mirrors that of the verbal interaction between mother and child. Great differences are evident in the quantity and quality of interaction (that is, being talked "with" as opposed to being talked "at"). Retarded language development in an adult may indicate an early environment in which language and communication were not emphasized. Mother-child interactions establish patterns for brain development which will have later consequences.

The area of socio-learning is devoted to the relationship between individuals and their environment, with observations leading to the development of new behaviors. Observational learning is concerned with mediating the performance of another person; then trying to perform a similar task while correcting, revising, sensing rules, and overgeneralizing in the process. Learning through this form of modeling involves multi-sensory inputs that combine with the selection of certain responses from the many that are available to the brain. Gradual revision

and improvement are made through use and social reinforcement until a reliable brain program is available for task performance (Languis, Sanders, and Tipps, 1980).

During the development of a reliable program for learning through observation and modeling, the individual need not have an actual source for reinforcement. Through the process of making incoming information meaningful, a person can imagine reinforcement consequences of behavior without experiencing them directly. Vicarious experiences, together with observations and reinforcement for modeling, greatly influence existing behaviors. Adults with learning problems are as vulnerable to adverse models as to favorable models, and often will not accurately analyze them or place them into a sequential order of events ("If I do this, the consequences will be ..."). Individuals having difficulties accurately comprehending sensory inputs can easily misread reinforcements for inappropriate behaviors. An adult with learning problems may view a frown (for disapproval of a behavior) accurately at one moment while ignoring it for a similar inappropriate behavior the next time. The learning that takes place in social settings may well be the cause of many inconsistent behaviors exhibited by adults with learning problems.

Two basic subprocesses must exist as prerequisites to learning by observation and modeling. These are attention to and retention of the incoming stimuli from the environment. The individual needs to be able to selectively direct their attention to features in the environment and also to be able to accurately process and remember the experience. Both of these subprocesses are characteristic areas of difficulties for adults with learning problems (Hilgard and Bower, 1975).

Adults with learning problems often tell of the horrors of public school experiences. These range from being mislabeled (placed in special education programs due to misdiagnosis or teacher frustrations with severe behavior problems), to being ignored (passed from year to year always with sitting in the back of the class), to constant berating and insults ("Don't bother with him, he's lazy and dumb.") It is no wonder that adults with learning problems do not look amicably upon their school days and do appear to be greatly affected by their early educational experiences.

The Handicapped Children's Act of 1975, PL 94-142, reflected the dreams of educators and parents that public schools would one day be able to assure every child appropriate educational services (Ballard and Zettel, 1977). Unfortunately, most adults have not had the advantage of recent research and knowledge regarding learning problems. Federal

legislation to support their right to special attention and services did not exist when many of today's adults were in school.

Developmental Aspects of Learning Problems

Cognitive development is based on principles of assimilation and accommodation. Assimilation is the process by which individuals incorporate objects or events into their existing cognitive structure. When new information is assimilated, it is accommodated and interpreted according to existing knowledge. The contents of the existing knowledge in turn becomes modified by the accommodation of the new material (Piaget, 1950).

In the assimilation process, if an individual has no existing framework for interpretation or similar experiences from which to contrast, compare, and build upon, the new material may be misinterpreted or not processed. Many adults had not developed the ability to understand information that was being presented to them during their early years of schooling. Terms like "immature" or "not ready" indicated that early exposures to basic academics were not assimilated. Similar to being at the right place at the wrong time, individuals can be set into a flow of activities and interactions for which they were not prepared (Epstein, 1978). The evil that occurs is that adults with learning problems may eventually arrive at the developmental stage where they possess an adequate framework for processing the information. They are then at the wrong place at the right time. A cycle of failure and a series of unsuccessful experiences became a way of life. Most adults with learning problems found that the only way out of the nightmare was to drop out of school and let time heal their wounds.

Recent research into adult development (Gould, 1978; Levinson, 1978; Erikson, 1963) offers a great deal of insight for adult educators. A life phase is a period when certain issues or adaptive tasks are of great importance. Life phases appear to be not only predictive, qualitatively different stages during adult life, but the transitions between them are rather sensitive times (Languis, Sanders, and Tipps, 1980). Adult life phases appear to be due to a combination of physiological/psychological and cultural experience. Returning to education is greatly influenced by an adult's life phase. Specific life-oriented goals can be motivators for attention and retention. Past experiences can be used as building blocks for the presentation of new knowledge.

Developmental stages throughout life clearly influence the emergence of learning. An individual's characteristic behavior as a learner depends partly upon the individual's developmental life-line. As each adult changes through the stresses and strains of movement through various life phases, their learning style will be altered. Adult developmental stages indicate that an individual will return to education with a more fully developed learning style than the first time around, in hopes of a second chance in spite of past failures.

DIAGNOSIS OF ADULT LEARNING PROBLEMS

Two important variables, the students and the learning environment, must be considered when diagnosing adult learning problems. Often, diagnosis centers solely upon student deficits, leading to attempts to remedy internal problems rather than to look at the social context in which the student must perform (Coles, 1978). Researchers in the field of exceptional children disagree as to the importance of diagnosing brain processes or functional behaviors (Cruickshank, 1977; Stephens and Magliocca, 1978; Kinsbourne, 1977). Their debate will certainly continue as each side appears to be dogmatic. Yet, both brain processes and functional behaviors are of great importance in identifying individual differences.

The purpose of diagnosis is not to label, or to identify neurological impairments, or find biological explanations for institutional failures, or discover "the" deficit, or rationalize failures due to lack of effort or motivation. Rather, diagnosis should focus upon gaining insight into individual differences. Diagnosis should note differences in processing information, screen for medical problems, assess the student's current knowledge, and determine how to best structure elements of the environment in order to facilitate maximum learning (Wittrock, 1978). The results of a diagnostic assessment should be used in determining the inter-relationship between the adult and the environment. The problems that an adult is experiencing are more than internal dysfunctions, they are also a manifestation of the complex interactions of our educational system, social conditions, and society.

THE DIAGNOSTIC PROCESS

The 1980's will see a major change in attitude toward teachers and their role in the classroom. Previous emphasis on what the teacher "does" is shifting to what the teacher "knows". The teacher's interaction with the student is becoming recognized as the critical component of the learning environment. The diagnostic process is an opportunity for the teacher to gain greater knowledge of the student as an individual. This knowledge is needed to develop a learning environment based upon the student's needs.

Just as there is a wide range of differences in processing information, there is an equally diverse range of diagnostic procedures. The teacher's knowledge is important in selecting the diagnostic format. Diagnostic procedures can be either formal or informal. Formal systems are structured, utilizing a combination of conventional assessments. Informal diagnosis is usually accomplished through observation and interview. Both should be included in the complete diagnostic process. In each case, a trained and knowledgeable teacher is critical to the process.

The diagnostic process is composed of seven steps (see Figure 5):

STEP 1: Hypothesize Learning Problems Through Observation

The first step occurs as the teacher begins to formulate, through observation, a hypothesis of the existence of a learning problem. Jordan's Nine Major Observable Characteristics offer the teacher a mental checklist for empirical observations. Specific problems may be noticed in academic, social, or personal behaviors. Environmental cues may be inadequately processed or the student may be having difficulty in appropriately responding to the cues. The observation may occur while a new student is filling out entry registration forms, being pretested, or beginning in academic work. Once the teacher has formed a hypothesis, it is time to initiate the second step of interviewing the student.

STEP 2: Conduct Interview With Student

The key to a good assessment is often determined by the initial interview. It is important that the learners become involved as early as possible in the diagnostic process if their insight is to be developed and their motivation secured (Valett, 1973). A value-free

attitude is essential in gathering information during the interview. Teacher comments should be reflective rather than qualitative. Observations should be related to both academic and affective domains. Carefully constructed questions can determine such valuable information as how and where the student prefers to learn, what types of learning are most difficult, how the student goes about learning difficult information, the degree of support needed in the learning situation, and self-appraisal of academic skills and educational/occupational goals for the adult education program.

The teachers may find it advantageous to discuss their observations with the student ("When you write, you seem to turn some of the letters around inside the words." "You don't seem to feel very good about yourself.") The adult needs to be encouraged to respond to the teacher's observations. Placing observations into questions such as, "Do you always get easily frustrated when you can't do something right the first time?", "Have you always had difficulty with reading?", or "How do you try to remember how a word is spelled?" will help the adult participate in the interview.

Adults who perceive themselves and their interactions with life unrealistically can be differentiated from those who have substantial insights into their own functioning. All of the adults' comments during the interview should be accepted whether they are accurate or inaccurate. The point of the interview is not to confront or threaten the students, but instead to gain an awareness as to the means and motivations for education and how the students perceive themselves. The interview can do much to enlist the support and trust of the student. If the teacher still hypothesizes that there are learning problems, further evaluation should be considered in order to acquire the specific information needed to alter the learning environment. With the student's consent, Step 3, screening and testing, should be implemented.

STEP 3: <u>Assess Learning Strengths and Weaknesses</u>

The diagnostic instrument is a tool for a specific purpose. This instrument provides a means for understanding the students by determining their learning strengths and difficulties, with behavior

implications (Valett, 1973). Selection of a diagnostic instrument should be based upon the accuracy and usefulness of the test results in making alterations to the learning environment.

Three types of evaluative instruments should be used in diagnosis of learning problems (Alley and Deshler, 1979). First, instruments that screen visual and auditory functions are important for identification of reception roadblocks. Referrals for further diagnosis and possible remediation can be made to medical specialists based upon this screening. Secondly, instruments constructed for assessment of academic abilities, such as criterion referenced tests, should be administered. In developing the learning environment, the student's previous knowledge is imperative in building a base for new cognitive constructs and mediation of new information (Wittrock, 1980). There are many standardized and teacher-made academic assessments available to the adult educator.

The third type of diagnostic instrument should be a tool for the identification of the student's strengths and weaknesses in learning. The instrument should offer the teacher different tasks from which to evaluate the student processing different types of information and requiring various responses.

A valuable diagnosis requires both an appropriate diagnostic tool and an accurate diagnostician's interpretation of test results. Unfortunately, most diagnostic instruments for learning problems are standardized and based upon children. An exception to this (Travis, 1979) is The London Procedure: A Screening, Diagnostic and Teaching Guide for Adult Learning Problems (Weisel, 1979). Another valuable instrument for adult educators in the identification of adult learning problems is the Slingerland Screening Tests for Identifying Children with Specific Language Disability (Slingerland, 1970). Though the Slingerland was developed for children, it is unstandardized and adaptable to the adult learner. A brief overview of each of these tests follows:

The London Procedure provides a screening of visual and auditory functions and a diagnosis of the mediational processes included in visual perception,

auditory perception, and reading as an encoding/decoding process. The instrument was designed for adults functioning below the eighth grade level. Within the procedure are fifteen short tests organized in five major areas, with an approximate administration time of forty-five minutes (The tests may be divided and given in sections). The purposes of The London Procedure are to: (1) assist in identifying adults in need of medical or optometric referrals for functionally-related learning problems; (2) assist in determining appropriate prescriptive instructional strategies based on the adult's strengths and weaknesses in processing information.

Decisions for prescriptive instructional strategies are based upon four kinds of information: (a) a profile of individual learning strengths and weaknesses; (b) observations from test administration related to how the adult appears to process information; (c) the adult's academic needs; and (d) the adult's goal for entering the adult education program.

The London Procedure is contained in two binders. The first is the "Manual and Teaching Guide," containing aspects of administration, interpretation of test results, instructional strategies, and a format for the development of an individualized teaching plan based upon the adult's test performance. Several complete case studies are provided. The second binder (The Test Plates) gives specific wording to be used to administer the procedure, stimulus test plates, and twenty-five diagnostic profile forms. Additional materials required are The London Procedure Vision Screening Kit and an audiometer.

The procedure was developed for administration by a wide variety of personnel. The most important factor for effective administration of the test is the examiner's familiarity with the procedure. Experienced teaching staff should be provided with specific training in test administration and evaluation. Ideally, the examiner should be the test interpreter and teacher. Costs of the procedure and vision screening kits are under $100.

Although the Slingerland Screening Tests were developed for children with specific language disability, it is an unstandardized instrument that is also appropriate for adults. The purpose of The Slingerland is to identify difficulties in perceptual

integration, processing, and productivity. The screening identifies specific perceptual-motor behavior that "is indicative of probable or potential interference with adequate development in reading, writing and spelling, and hence, in other academic achievement." (Slingerland, 1970) The tests show relative strengths or weaknesses that may exist in visual, auditory, and kinesthetic functioning. There are graded levels for primary grades (three different levels for students at the primary levels and one for students functioning at the fifth/sixth grade level) which vary in vocabulary.

Slingerland provides eight tests that examine the areas upon which written language, reception, and expression depend. These include the process of association and the interaction of perception, discrimination, integration, memory, and performance. Complete testing takes approximately one hour, but the tests may be administered in sections. The tests were originally designed for both group and individual administration. For the adult learner, individual administration is recommended.

The Slingerland Screening Tests consist of a manual for tests A, B, and C and a separate manual for test D. The manual offers both general and specific directions for test administration, scoring of tests, and test analysis. Charts and cards for test administration are included along with a student's test folder. The cost of the screening is under $75. Although The Slingerland does not offer teaching alternatives for the identified problems, it is an excellent assessment for the identification of information processing problems.

The Slingerland Screening Tests may be administered by instructional staff who have carefully reviewed the manual. Previous experience in learning problems along with specific training in adult learning problems is advised for accurate test interpretation, analysis, and implementation into actual teaching.

STEP 4: Provide Feedback on Diagnosis to the Student

Diagnosis is something we do with students, not something we do to them. It is essential that test results be discussed with the adult immediately after testing. The adult should be given an overview of the examiner's insight into the approach to

processing information. There are no rights or wrongs, goods or bads in diagnosis. The overview needs only to be general, i.e. "You were able to copy the drawings, but you seemed to have a hard time with remembering the numbers that I said to you." Specific tasks should be referred to by function rather than by title ("copying those drawings" rather than "visual motor integration. The adult should be encouraged to respond to the examiner's insights. Questions such as "Has it always been difficult to remember what someone has read to you?" will help the adult participate and understand what is being explained. Honesty is important, tact is more important, but having the adults understand what is explained to them during the feedback is most important of all (Weisel, 1979). Test results should be explained as valuable information to assist the adult in learning, and the teacher in preparing for a successful learning experience.

STEP 5: Develop Learning Plan

Diagnosis is useful only if the educator has expertise in transferring the adult's learning strengths and weaknesses into a learning plan. After all data has been gathered, priorities for instruction must be established (Gordon and Allen, 1979). The learning plan is an alternative to the traditional educational environment, carefully designed to facilitate maximum learning. The educational plan should build upon the learner's previous knowledge, utilize the adult's learning style, and use specific information regarding processing needs and student's goals in directing learning activities. The educational plan will determine the selection of materials, modalities of input, and integration skills necessary for processing and evaluating new information and environmental conditions.

STEP 6: Confirm Learning Plan With Student

Including the student in the developing of the educational plan is important for two basic reasons: first, to insure that the examiner has been accurate in assessing the adult's goals; and secondly, to explain the purpose of the educational plan. The adult student needs to understand why specific activities have been planned. A dry run of the location and and utilization of materials will be of great benefit The student should help make decisions as to time

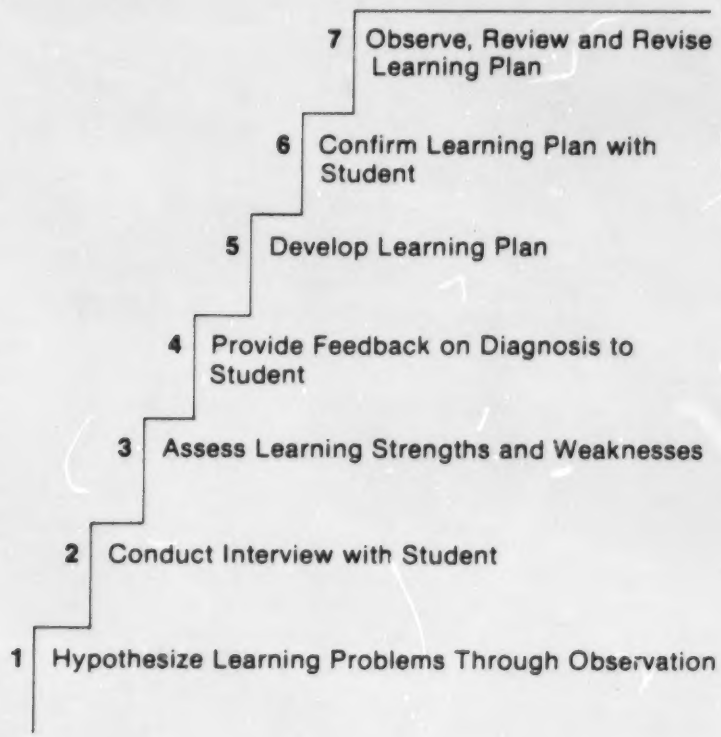
limitations and expectations. Any and all comments of the student should be considered in altering the educational plan.

STEP 7: Observe, Review, and Revise Learning Plan.

Teacher observation is important while the student is engaged in following the educational plan. Alterations in the plan will help to avoid frustrating experiences and reinforcement of negative self-image. Daily review of the learning activities with the student is essential. For learning to be transferred and retained, it must be applied and related to past knowledge (Evan, 1978). Weekly revisions of an educational plan are advisable with the student and teacher working together to establish an equal sharing relationship.

Steps to the Diagnostic Process

FIGURE 5


7 Observe, Review and Revise Learning Plan
6 Confirm Learning Plan with Student
5 Develop Learning Plan
4 Provide Feedback on Diagnosis to Student
3 Assess Learning Strengths and Weaknesses
2 Conduct Interview with Student
1 Hypothesize Learning Problems Through Observation

LEARNING STRATEGIES: TRANSFERRING DIAGNOSIS INTO INSTRUCTION

Keefe (1980) states that the learning process is affected by the learning environment, the teacher's teaching style, and the student's learning style (strengths and weaknesses). The key to working with the adult experiencing difficulties with traditional education is to match instruction with the student's learning style. Reform efforts of the 1960s and 1970s have moved individualized instruction to the forefront of American education. For the adult with learning problems, individualization means more than meeting the student's academic needs. An individualized approach to education incorporates the student's learning styles with their academic and occupational goals. For the adult with learning problems, individualization becomes very complex.

Educators have become aware of the teachers' attitudes and the power they can exert over the success or failure of the student. These self-fulfilling prophecies (Jordan, 1977; Jones, 1979) determine the relationship between the adult and the teacher, and the atmosphere for learning. The teacher must understand the adult's overall needs. The adult who experiences difficulty in comprehension and retention of information needs to make sense of the material presented. The teacher's mission is to make learning easy, to help rather than interfere with the learning process (Smith, 1979). There are many easy ways to make learning more difficult for the adult with learning problems. An inappropriate learning environment (a distracting learning center when quiet isolation is needed) or totally individualized learning (when verbal interaction is an essential part of the student's learning style) can produce an unsuccessful learning experience. There is only one way to make learning easy, and that is to make learning easy. This means to make learning a meaningful, enjoyable, and successful experience.

TEACHING THE ADULT WITH LEARNING PROBLEMS

To start this key portion of the monograph, the author would like to make a controversial statement: Teachers cannot teach! This does not mean that teachers are incapable of teaching, instead it means that the learning process is not teachable. Kugel (1979) makes a distinction between saying that learning cannot be taught, and saying that information cannot be learned. The "sponge" theory of learning compares a student's mind to a sponge and the teacher to a pitcher full of knowledge. The teaching process is one in which the pitcher is poured over the sponges that soak up the knowledge. If the fluid is properly poured, then the sponges absorb the liquid. Although teachers teach as though this theory was true, they also know that students do not always learn what is taught, no matter how well it is taught. Snyder (1971) and Holt (1964) note that what is most often learned (the invisible curriculum) is something quite different than that which has been taught.

Student-centered theories of adult education (Knowles, 1975; Tough, 1979; Bergevin, 1967; Beene, 1957; Lindeman, 1961) view the teacher's role as a sharer of information, a helper in making information meaningful, an expert resource, and a therapist for removing blocks to learning. Each of these is exceptionally true when working with the adult demonstrating learning problems.

Wittrock (1980) places the teacher's role in perspective as a part of the learning process. He identifies three essential elements necessary for learning to take place: effort, attention, and comprehension. Effort is essential on the part of the student. Students who feel in control of their lives and responsible for their fate are more likely to put forth a maximum effort to learn. The teacher is needed to support that independent control and if need be, to foster and nourish it. This will reinforce the student's power of learning and build self-confidence. Teacher-centered education, emphasizing the importance of the teacher as the sole source of learning and information, is negative to the adult with learning problems. Only through student-centered instruction can the adults realize their importance in the learning process and put forth the necessary effort to overcome difficulties.

Adults with learning problems have problems with attention. Students need to consciously focus their attention on the source of information if comprehension is to be accomplished. Information focused on the student's academic and occupational goals will aid in maintaining the student's attention.

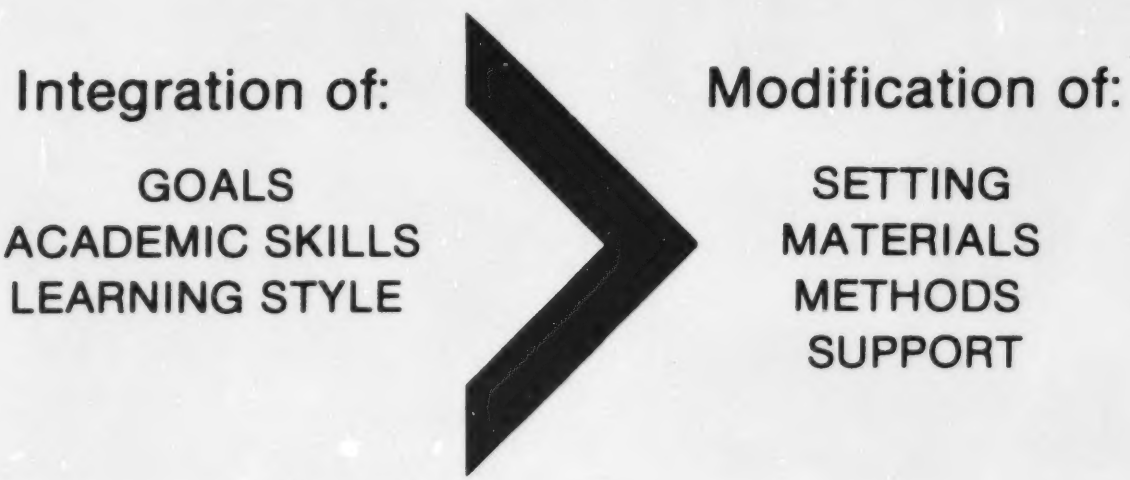
Building upon the student's previous experiences and including the student as an active participant in instruction will enhance the ability of attending to given tasks.

Comprehension is a natural need to assimilate and make meaningful the world in which we live. Adults with learning problems often have difficulty in putting two and two together and coming up with four. Concept formation and the building of relationships, an essential part of learning, are frequently vague and disorganized. The teacher who understands the learning process (information processing interfacing with environment) can begin to see how the world is viewed through the eyes of each individual student. Comprehension can then be enhanced by student-centered learning strategies.

Learning strategies should provide for the assimilation of new information with the development of techniques or principles that facilitate the acquisition, manipulation, integration, storage, and retrieval of information (Alley and Deshler, 1979). In other words, learning strategies promote specific learning through development of successful alternative learning styles. This integration includes the student's academic level, academic goals and needs, resources of materials, and knowledge of learning strengths and weaknesses (figure 6). Once these have been identified, the academic setting, selection of materials, methods, and amount of support needed for learning can be modified to enhance the learning environment.

Educational Management through Learning Strategies

FIGURE 6



Learning strategies can be viewed as remedial or compensatory. Remedial strategies are used to upgrade weak skills in processing information. Compensatory strategies use the student's strengths in learning style as the basis for interaction with new information. Remediations might be seen as trying to forge through a roadblock and rebuild a damaged road while compensations provide alternative routes. An example of a remedial strategy might be to attempt to increase a student's ability in recalling instructions that are given orally. This could be done by placing the adults in a structured learning situation in which they would be asked to respond to increasingly complex sets of instructions. Most often, remediations do not work (Lyon, 1977; Smith, 1979; Hammil and Goodman, 1974). Remediations that seem to work are actually the formation and utilization of undeveloped resources rather than reconstruction of old skills.

Compensations help to develop skills that will allow students to meet immediate requirements successfully, and also to generalize these skills to other situations. Compensation strategies for an inability in recalling auditorily presented instructions might include having the adult identify when this type of difficulty occurs, and then looking for ways to improve their recall. Compensatory techniques could range from learning when to ask questions for both review and clarification (Example: "Did you say to turn left at the light?") to note taking or tapping of fingers to count the number of separate parts to the instructions.

GENERAL LEARNING STRATEGIES

Three general learning strategies are recommended in working with adults with learning problems. First, a nontraditional learning environment must be established (Mocker, 1978). Nontraditional, referring to student-centered, is directly based upon the student's learning needs, and is informal. In a relaxed environment, the student may drink coffee/tea, smoke, talk freely, and move about. This atmosphere will associate learning with comfort rather than the strict, [illegible], and emotional feeling associated with earlier school experiences. Nontraditional does not mean unstructured. Adults with learning problems are usually in need of a great deal of structure in their educational plans, but the surroundings can still be informal (Husey, 1979).

A second general learning strategy is to make the adult an active rather than a passive learner. To accomplish this, at least three modes of input should be included in each instructional task. Combinations of visual, auditory, kinesthetic, and tactile modes offer interpretation through

several channels. This does not imply that the adult with learning problems should be bombarded with stimuli; instead, it offers options for learning strategies that will promote a more successful learning experience. Most adult education materials are print (visual) and require writing for evaluation. They do not allow alternatives in information processing. They are the traditional approaches in which the student has previously failed. Adding an optional learning strategy, such as, "if you are having difficulty understanding what is written, begin to read it out loud to yourself and trace your finger under the line while you are reading," can lead to improved comprehension. These are alternative strategies commonly resorted to when difficulties are encountered; but for the adult with learning problems, they are strategies that need to be built into the educational process.

A standard procedure for word recognition, discrimination, storing math facts, or spelling is a multi-sensory approach (visual, auditory, oral, tactile, and kinesthetic) in which the adult verbalizes the word (spells or states the number fact) while tracing the letters. In such a case, the students begin to "see" the word through more than just their eyes, they feel the word on their lips, hear the word, and feel the word through tactile stimulation. Using more than one mode of input focuses the students' attentions on the task and makes them an active participant in the learning process.

A third learning strategy is to have the adults give a verbal summary of what they have learned. Verbal review gives the learners dual feedback on the accuracy of their cognition, first from hearing themselves and second from environmental feedback. The adage, "you've never really learned something until you can explain it to someone else," holds true. The learning activity will be enriched when the student shares the newly processed information. This can be done by having students work in pairs for peer tutoring or discussions. Recent studies (Weisel and White, forthcoming) found that retention of low level students in Adult Basic Education programs improved if group activities were available. Individualization often results in isolated activities, rather than being based upon the learner's requirement for information processing. Individualization can also be accomplished in groupings or paired learning. In the case of adults with learning problems, the student's style of learning is primary in developing the learning environment. Emphasis can then be focused upon the development of academic skills.

These general learning strategies will aid any adult in "learning how to learn" (Smith and Haverkamp, 1977). More teacher time will be devoted to instructional activities that

will enable the adults to become more effective learners (Tough, 1979).

SPECIFIC LEARNING STRATEGIES

When a complete diagnostic assessment confirms that an adult has specific areas of difficulty in the processing of information and interacting with the environment, special procedures are required. Strategies should provide a learning environment that will facilitate the greatest positive interactions. The following strategies are offered as alternatives to traditional instruction based upon specific areas of difficulty. They are options that need to be placed in the context of each independent situation. Specific learning strategies are ingredients that need to be mixed in the proper quantities to insure a perfect outcome.

Visual processing difficulties include discrimination between symbols (b from d), spatial relations (identifying where one word ends and another begins, i.e., reading spaces), position in space (identifying similar words in a book that may also be on a chalkboard), directionality (up, down, right, left, or where to begin reading on a page), figure-ground relationships (identifying parts within a whole) and visual memory. These can be compensated for in the following learning strategies:

- Make the visual instruction meaningful, i.e., based upon what the student already knows.
- Avoid discrimination of letter symbols or words in isolation; context clues are essential for beginning reading.
- Use an auditory stimulus (tape recording, verbal cue or language master) to accompany visual material.
- Maintain an uncluttered desk and work area that is free from visual distractions.
- Use material that has large print and clear pictures.
- Use word attack approaches that rely upon the student's own experience; word families and context clues.
- Offer the multi-sensory approach for spelling.
- Give oral directions to match any of those that are written.

- Have the adult use a bookmarker, or finger, to keep place while reading.

- Suggest techniques for underlining or highlighting while reading.

- If the adults are having reversal difficulties, have them identify their own approach to distinguishing differences. One approach may be to have the student directly manipulate confusing letters or words, get feedback, and evaluate their own progress. Avoid magnifying discrimination difficulties as an insurmountable handicap of reading.

Visual motor integration difficulties include problems in copying (from book or board), answering questions with a written response, sentence completion, eye-hand coordination, and fine motor coordination. These difficulties can be adapted into the learning environment with the following strategies:

- Build sentences, words, or number problems with cards that already have the symbols printed on them.

- Encourage vocabulary or the memorization of spelling or math facts by a see, hear, and say approach.

- Avoid having the adult write, copy, or transcribe; use tape recorders or typewriters whenever possible. Allow for alternative measures of students' evaluations including teacher discussion, taping answers, or peers helping to transcribe.

- Find materials that have simple answer codes, i.e., multiple choice, checklists, etc.

- Use acetate pages over printed pages for sentence completion or math problems.

- Reduce extra visual distraction by covering up all print other than what is to be copied.

- Encourage the students to verbalize that which is to be copied and how to copy it (e.g., "I start with a 'w' at the top, come down, then up, then down, and then up again").

- Work math problems on an adding machine or calculator.

- Use programmed materials that require little writing or consumable materials that can be directly written on.

Auditory comprehension and sequential memory require both short-term memory storage, quick analysis of auditorily presented information, and long-term memory storage for detailed discussions. Such tasks as following oral directions, listening to taped materials, or comprehending and following a group discussion can be a very frustrating experience. The following learning strategies can help to compensate for these difficulties when the adult must interact with auditory stimuli:

- Build upon what the student already knows; meaningful comprehension most often relies on understanding the concepts being discussed.
- Give written directions to accompany oral directions.
- Ask short, one-concept questions; give specific short instructions.
- Avoid the use of a tape recorder or materials accompanied with tapes.
- Teach spelling and number facts by visual memory; techniques such as see, say, and write.
- Place the student away from auditory distractions.
- Use sight words, configuration cues, word families, and student experiences for approaches to word attack skills.
- Encourage the adults to repeat to themselves the major points that were said.
- Use techniques such as note taking and questioning in lecture or discussion situations to maintain the student as an active participant.
- Have the adult and the teacher develop techniques to use when increasing comprehension for listening tasks.
- Allow a time when the student is to summarize aspects of an explanation or discussion.

IMPLICATIONS AND RECOMMENDATIONS

Three major areas regarding adult learning problems have been reviewed: (1) the learning process (brain functions and environmental and developmental factors which contribute to learning problems); (2) diagnosis; and (3) learning strategies. Those who have gained insights into learning styles, individual differences, and alternatives to traditional instruction have the potential to exert both substantive and substantial influence on adult education in the years ahead. The review of policy and program implications shows how professional leadership might capitalize on these understandings (Languis, Sanders, and Tipps, 1980).

Effective adult education programs are dependent upon several important factors. While each factor need not be present for successful operation of a program servicing adults with learning problems, absence of individual factors has been found to detract greatly from an effective program. These factors include administrative commitment, a staff development program, supportive service, and priorities in program expenditures. The degree of success in working with the adult experiencing learning problems is largely a result of the degree of support available.

ADMINISTRATIVE COMMITMENT

Administrators bear ultimate responsibility for programming. It is recognized that leadership is a major aspect of administration (Langerman and Smith, 1979). Programs designed to meet the special needs of adults with learning problems can only exist through enlightened leadership of top level administrators.

Administrative commitment begins with the realization that learning problems exist both in children and adults. Adults with learning problems constitute a significant portion of those who are undereducated and frequently unemployed, and are hence most in need of education. Education can make a difference in the lives of these persons, but educational programs must be designed for their special needs.

Administrative commitment must be made to programs calling for low teacher-student ratios, specially trained staff, and in some cases, specially designed learning environments. These programs will be more expensive, perhaps, then traditional programs. Student time in programs may exceed the norm. With support, however, success can be achieved. Profound changes can be made in the lives of adults. These changes can result in their social, vocational, and monetary improvement.

Commitment from national leaders influences programs and budgets through legislation and the establishment of national priorities. Those leaders must be made aware that adults with learning problems constitute a majority of the adult population that is least educated and most in need.

State-level administration can be supportive of the federal commitment to serve the least educated and most in need by providing awareness of the area of adults with learning problems to local program directors, offering staff development for the training of teachers in this specialized area, acting as a resource for the development of model programs within the state serving adults with learning problems, and setting priorities in fiscal expenditures.

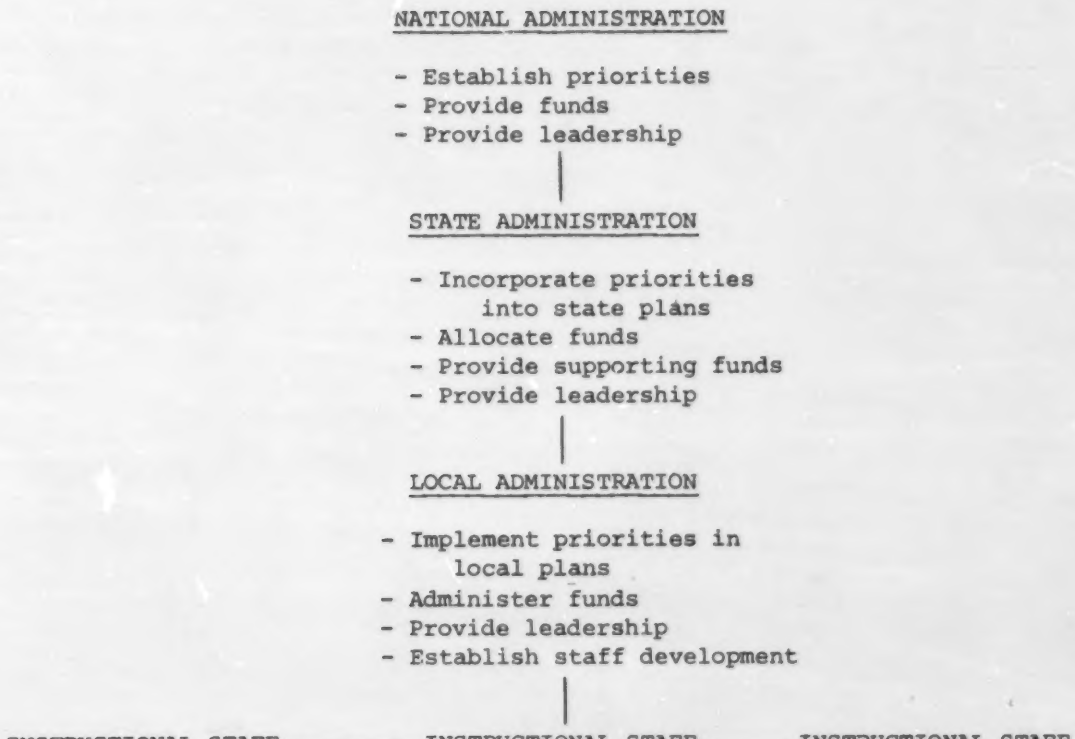
Local administrators play a key role in providing onsite leadership, staff development programs, and in providing direction and a supportive environment for developing educational programs for serving the population of adults with learning problems.

Instructional staff are ultimately the most important link in this chain. Direct services provided to the adult student need to be based upon the teacher's knowledge of the student's individual learning style. Effective educational programming can only be the culmination of administrative support, priorities, and staff development.

The horizontal flow of program administration from national to local levels, illustrated in figure 7, can be directly applied to adults with learning problems. Administrative

ADMINISTRATIVE COMMITMENTS

Figure 7



commitment is needed on each level, so that national priorities can be assured of implementation on the local level.

STAFF DEVELOPMENT

Procedures for screening, diagnosing, and developing learning strategies depend upon a well-trained staff. Unfortunately, little information is available for adult educators in regard to adults with learning problems, and few resources can be identified to provide training. Many Departments of Exceptional Children within the University know very little about adult education. Departments of adult education often know very little about the adult with exceptional learning problems. While the area of adult learning problems covers multidisciplines, major universities and colleges are often not equipped to function interdepartmentally.

In recent years, many states have used funds provided through the Adult Education Act of 1966 to develop knowledge and skills in working with adults with learning problems (Travis, 1979). Films, videotapes, and print material are rapidly becoming available. A cadre of teacher training resources is emerging, although leadership from institutions of higher education have been slow to develop. To date, only a few institutions of higher education have offered courses including adult learning problems or interdepartmental efforts toward researching the problem. Instead, staff development is often initiated on the state level. In states such as Ohio, Connecticut, Pennsylvania, Iowa, Kansas, Maine, Arkansas, Oklahoma, Tennessee, Florida, Arizona, Michigan, West Virginia, and Kentucky adult education staff have participated in state-sponsored in-depth training and returned to their local sites to share practices and procedures. Occasionally, larger local districts provide their own training. In each case, staff development has proved to be most effective when several sessions are extended over several months. In this model of staff development, the teachers are given time to mediate new information, try new approaches within their classes, do outside reading, and receive feedback to their concerns and questions. One-time sessions for staff development for the area of adult learning problems can barely provide an awareness to the intricacies of the learning process, breakdowns in these systems, and quick general suggestions to alternatives in learning strategies. Without the time for assimilation and feedback (the same features are necessary for all information processing, be it with staff or students), staff development is often only high class entertainment without allowing for the transference of learning into practice.

SUPPORTIVE SERVICES

Retention of adults with learning problems has been found to depend heavily upon key support services. Support services that maintain a student's retention, specifically in an ABE setting, include screening of health problems (vision and auditory), diagnosis of learning problems, counseling, individualization of instruction (including grouping when feasible), and use of audio-visual equipment (Weisel and White, forthcoming).

Learning differences will not be quickly identified, nor learning strategies developed without allowing for teacher time to be spent in diagnosis and counseling. This does not mean that teacher time should be restricted to these tasks, but instead, that these tasks need to be viewed as prerequisites to instruction. Without adequate diagnosis and counseling, individual differences cannot be identified and appropriate teaching strategies cannot be developed. Administrative commitment should insure teacher time for instruction and for other support services. The teacher cannot be expected to provide support services and be responsible for instruction at the same time. A fair allocation of time might be one hour of support services to each four hours of instruction, but this will vary with existing program requirements and intake procedures.

PRIORITIES IN PROGRAM EXPENDITURES

Teaching adults with learning problems will take more teacher time and program expenses than are currently being expended on local, state, and federal levels. In establishing priorities within local budgets, administrators may find that paraprofessionals can be effectively utilized (both in being trained to work with adults having learning problems or maintaining instruction for independent higher level learners). Higher level independent students can possibly be maintained in a learning center having high student/teacher ratios, leaving lower student/teacher ratios for those lower level dependent learners. The goal of adult education programs, educating the least educated and most in need, will be more realistically met when adults with learning problems are recognized as a key target population. Meeting the needs of this key population requires support through administrative commitments, trained staff, supportive services, and priorities in program expenditures.

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